99TH CONGRESS
1st Session

HOUSE OF REPRESENTATIVES

REPT. 99-90
Part 2

EARTHQUAKE HAZARDS REDUCTION ACT AUTHORIZATION, FISCAL YEARS 1986 AND 1987

MAY 21, 1985.—Committed to the Committee of the Whole House on the State of the Union and ordered to be printed

---

Mr. FUQUA, from the Committee on Science and Technology, submitted the following

REPORT

together with

ADDITIONAL VIEWS

[To accompany S. 817]

[Including cost estimate of the Congressional Budget Office]

The Committee on Science and Technology, to whom was referred the bill (S. 817) to authorize appropriations under the Earthquake Hazards Reduction Act of 1977 for fiscal years 1986 and 1987, and for other purposes, having considered the same, report favorably thereon with amendments and recommend that the bill as amended do pass.

The amendments (stated in terms of the page and line numbers of the introduced bill) are as follows:

Page 1, line 9, strike out "$5,705,000" and insert in lieu thereof "$5,596,000".

Page 1, line 10, strike out "$5,962,000" and insert in lieu thereof "$5,848,000".

Page 2, line 4, strike out "$35,578,000" and insert in lieu thereof "$35,044,000".

Page 2, line 5, strike out "$37,179,000" and insert in lieu thereof "$36,621,000".

Page 2, line 9, strike out "$28,700,000" and insert in lieu thereof "$27,760,000".

Page 2, line 10, strike out "$29,992,000" and insert in lieu thereof "$29,009,000".

51-006 O

H703-6.

Strike out line 19 on page 2 and all that follows down through line 2 on page 3, and insert in lieu thereof the following:

> (E) compile and maintain a written plan for the program specified in subsections (a), (e), (f), and (g), to be submitted to the Congress and updated at such times as may be required by significant program events, but in no event less frequently than every three years;

SEC. 6. Section 5(b)(2) of such Act (42 U.S.C. 7704(b)(2)) (as amended by section 5 of this Act) is further amended by redesignating subparagraph (F) as subparagraph (G), and by inserting after subparagraph (E) the following new subparagraph:

> (F) make, in cooperation with the United States Geological Survey, the National Science Foundation, and the National Bureau of Standards, an annual presentation to the appropriate committees of the Congress within 60 days after the end of each fiscal year for the purpose of communicating any events and any programmatic requirements deemed significant by the National Earthquake Hazards Reduction Program; and

PURPOSE OF THE BILL

The purpose of the bill is to authorize appropriations to carry out the Earthquake Hazards Reduction Act of 1977 for fiscal years 1986 and 1987, as follows:

National Earthquake Hazards Reduction Program

Fiscal years:	
1986	$68,899,000
1987	71,999,000

CONTENTS

		Page
I.	Background and need	3
	Earthquake Hazards Reduction Act of 1977	3
II.	Summary of Committee actions:	
	Budget total	4
	Purpose of the Bill	4
	Comparison with Budget Request and Senate Action	4
III.	Committee views	5
	The Federal Emergency Management Agency's Leadership Role	5
	Update of the Five-Year Plan	5
	Societal Response Earthquake Research Programs at the National Science Foundation	7
	Importance of the Continental Lithosphere Program at the National Science Foundation	8
	Importance of the United States Geological Survey Program	8
	Importance of Eastern Earthquake Research	9
	Importance of the Center for Building Technology at the National Bureau of Standards	10
IV.	Section-by-section analysis	11
V.	Changes in existing law made by the bill, as reported	12
VI.	Oversight activities	14
VII.	Oversight findings and recommendations by the Committee on Government Operations	15
VIII.	Cost Estimate—Congressional Budget Office	15
IX.	Budget Analysis and Projection	17
X.	Effect of legislation on inflation	17
XI.	Committee recommendation	17

Page
XII. Administration views 17
XIII. Additional views 19

I. BACKGROUND AND NEED

Earthquake Hazards Reduction Act of 1977

All or parts of 39 States lie in regions classed as having major or moderate seismic risk. Within these States, more than 70 million people are exposed to earthquake hazards of ground shaking, surface faulting, earthquake ground failures and tsunamis.

Congress found that a choherent earthquake hazards reduction program was needed so that this Nation could work in a rational way to reduce the damage done by earthquakes. Consequently, in 1977 the Congress responded to the problem posed by earthquakes by enacting the Earthquake Hazards Reduction Act of 1977 to reduce the risks to life and property from future earthquakes. The emphasis of the act is on prevention and preparedness as distinct from disaster relief.

The act established the National Earthquake Hazards Reduction Program [NEHRP], a multiagency effort to meet the congressionally mandated objectives. The agencies involved are: the Federal Emergency Management Agency [FEMA]; U.S Geological Survey [USGS]; National Science Foundation [NSF]; and the National Bureau of Standards [NBS]. The roles and responsibilities of these agencies are as follows:

FEMA has primary responsibility to plan and coordinate the NEHRP; assist States and local governments with earthquake mitigation and preparedness planning; coordinate Federal activities in response to a declared earthquake emergency; and develop improved seiesmic construction codes, standards and practices.

USGS conducts and sponsors research on the nature of earthquakes, earthquake prediction, and induced seismicity. In addition, USGS evaluates geologic hazards, prepares seismic risk maps; evaluates earthquake predictions; and provides data on earthquakes.

NSF sponsors research on earthquakes processes in its geophysics program and on earthquake engineering and socioeconomic implications of earthquakes in its civil and environmental engineering program. NSF's societal response program supports research on the responses of individuals, organizations, and communities to earthquakes and related hazards.

NBS contributes research on earthquake-resistant construction. It also provides technical assistance to other organizations in the development of design and construction provisions to reduce earthquake hazards in buildings.

In fiscal year 1984, approximately 75 earthquakes capable of causing significant damage (magnitude 5 or greater) occurred throughout the U.S. The two largest magnitude events which caused damage occured in California and Idaho: Property damage in the Morgan Hill, California, earthquake approached $7.5 million, while the Borah Peak, Idaho, earthquake caused an estimated $15 million in public and private property damage and led to the death of two children who were struck by a falling building facade. Although damage was minor, shocks from lesser magnitude earth-

quakes in New York and Pennsylvania startled the East Coast drawing attention to the vulnerability of the entire country to the earthquake hazard.

The National Earthquake Hazard Reduction Program is working to reduce the risk from future earthquakes in the United States.

II. SUMMARY OF COMMITTEE ACTIONS

Budget Total

The President's budget for fiscal year 1986 included a request for $68,899,000 as follows: FEMA—$5,596,000, USGS—$34,603,000, NSF $28,700,000 and elimination of the earthquake program at NBS for the National Earthquake Hazards Reduction Program in new obligational authority. This represents a $1,619,000 reduction from the funds available in FY 1985 for these programs which total $70,518,000. For FY 1987, the President requested "such sums as may be necessary." Also, the President's budget includes a requirement to update the written pan for the Five Year Plan for the National Earthquake Hazards Reduction Program whenever necessitated by significant program events, but at least every five years.

S. 817, as amended by the Committee includes the same total as the President's budget of $68,899,000 but differs in totals for individual agency programs as follows: USGS—$35,044,000, NSF—$27,760,000 and NBS—$499,000. The bill includes the same funding level as the President's budget for FEMA—$5,596,000. For FY 1987, the authorization for each program is increased by 4.5%. Also, included is a requirement to update the written plan for the Five Year Plan for the National Earthquake Hazards Reduction Program every three years.

Purpose of the Bill

The purpose of the bill is to authorize appropriations to carry out the Earthquake Hazards Reduction Act of 1977 for Fiscal Years 1986 and 1987 as follows:

Agency	Fiscal year	
	1986	1987
FEMA	$5,596,000	$5,848,000
USGS	35,044,000	36,621,000
NSF	27,760,000	29,009,000
NBS	499,000	521,000
Total	68,899,000	71,999,000

Comparison With Budget Request and Senate Action

Committee actions on the President's budget request and Senate action for the National Earthquake Hazards Reduction Program are reflected in the table below:

NATIONAL EARTHQUAKE HAZARDS REDUCTION PROGRAM BUDGET COMPARISONS—ACTIONS BY THE COMMITTEE ON SCIENCE AND TECHNOLOGY

(Millions of dollars)

Agency	Fiscal year 1985	Fiscal year 1986 Administration request [1]	Action by Senate		Committee Recommendation S. 817	
			Fiscal year 1986	Fiscal year 1987 [2]	Fiscal year 1986	Fiscal year 1987 [3]
FEMA	$5.705	$5.596	$5.705	$5.962	$5.596	$5.848
USGS	36.554	34.603	35.578	37.179	35.044	36.621
NSF	27.760	28.700	28.700	29.992	27.760	29.009
NBS	0.499	.000	.499	.521	.499	.521
Total	70.518	68.899	70.482	73.654	68.899	71.999

[1] For FY 1987, the Administration request is "such sums as necessary."
[2] Senate bill (S. 817) has 4.5 percent increase for fiscal year 1987.
[3] Committee Recommendation has 4.5 percent increase for fiscal year 1987.

III. COMMITTEE VIEWS

The Federal Emergency Management Agency's Leadership Role

Committee View

For the second year, the Committee has heard evidence in authorization hearings that FEMA has taken initial steps toward carrying out its leadership role in the National Earthquake Hazards Reduction Program. Signs of progress at FEMA include: completion of the 5-year plan for the National Earthquake Hazards Reduction Program which was sent to Congress in December 1984; support for programs conducted by the Building Seismic Safety Council and Interagency Committee on Seismic Safety in Construction; and partial funding of the Southern California Earthquake Preparedness Project. The Committee understands that FEMA has developed and revised a Federal level response plan for a catastrophic earthquake. Since FEMA has shown improvement in coordinating and managing the National Program, the Committee believes a 2-year authorization will provide further stability to the program.

The amendment adopted by the Committee, is $109,000 less than the FY1985 appropriations, but equal to the President's request for FY1986. The fiscal year 1987 levels were set at 4.5 percent above the fiscal year 1986 level.

Update of the Five-Year Plan

Committee View

The Earthquake Hazards Reduction Act, as amended in FY1981 requires the writen plan for the National Earthquake Hazards Reduction Program to be updated every year. The plan provides the goal, objectives, and funding requirements for each major program element. The Administration requested that the updating requirement be modified to once every 5 years. The bill as passed by the Senate requires an update every two years. The Committee agrees that updating the plan every year may be unnecessary, but believes that it is useful for the agencies to assess the plan more fre-

quently than every 5 years, and further believes that updating the plan will require less effort than was required originally to prepare the plan. The Committee expects this important plan to be updated every 3 years and delivered to Congress within 30 days following the beginning of the first session of each Congress. The intent is to have the plan delivered before Congresss considers reauthorization legislation.

FEMA is also required to send an annual report to Congress. This important report differs from the Five-Year Plan in that it should show the activities undertaken during the past year that deviated from the Five-Year Plan and should show what needs to be done to get back on track with the Five-Year Plan. In addition, the annual report outlines what was accomplished, what management steps were taken to assure that funds were well used, and how each agency is moving towards goals within the Five-Year Plan. The annual report for the program is a useful document and should continue to be delivered to Congress.

Feasibility Studies on Large Scale Engineering Facilities

Committee View

In 1984 the National Research Council (NRC) undertook a study, at the request of the Office of Science and Technology Policy which resulted in a report entitled, "Earthquake Engineering Facilities and Instrumentation". The Study reviewed the need for large scale experimental facilities and instrumentation, looked at the feasibility of meeting the perceived need, and assessed the priorities for a U.S. program to fill the need. Identified in the study as the highest priority, was the need for enhancement of the research/educational base in universities under the Federal goverment's earthquake engineering program.

The report also concluded that "The Federal government should underake, on an accelerated basis, planning aimed at developing a major national earthquake engineering experimental/test facility." As a first step, the report recommended that a conceptual engineering design study be initiated of a facility "capable of both dynamically and statically testing full- or nearly full-scale multi-story buildings to destruction in a simulated earthquake environment." The Five-Year Plan for the National Earthquake Hazards Reduction Program responds to this recommendation by proposing a two-year budget totalling 1.5 million for a conceptual engineering design study with the notation that "allocation of funds is predicated on approval of the NRC's report recommendations."

During authorization hearings on March, 1985, several academic witnesses also highlighted the need for conceptual engineering design studies on development of future large-scale experimental facilities. The Committee encourages FEMA, NSF and NBS to consider conducting conceptual engineering design studies for national earthquake engineering design facilites. The design studies should also include an assessment of the feasibility of international cooperation, should such a facility be a long-term proposal.

Societal Response Earthquake Research Program at the National Science Foundation

Committee View

The Committee notes the National Science Foundation (NSF) plans to discontinue the Societal Response Earthquake program as an identifiable program with a separate budget. The Committee would prefer that an identifiable program be maintained. However, the Committee appreciates the Foundation's rationale that the overhead associated with a separate program cannot be justified. Thus, the Committee directs NSF to monitor the program to ensure that funds consistent with the importance of the program continue to be obligated.

One important focus of the research program has been translation of scientific and engineering knowledge into public policy. Since fiscal year 1983, the Committee has heard testimony that advocated the need for better utilization of technical and scientific knowledge generated from the National Earthquake Hazards Reduction Program. During authorization hearings, the Committee learned that knowledge gained through the research process often reaches other researchers, but is less generally available to such non-researchers as realtors, developers, lenders, planners, and municipal officials. This has been reflected by a limited utilization of such knowledge by state and local officials and by the private sector.

The need for a Societal Response Research element in the National Earthquake Hazards Program is further justified by the varied nature of the program itself. Since the program is a multidisciplinary, multi-agency and multi-governmental effort, it is easy for the various efforts to become separated, isolated and fragmented. By combining knowledge from the earth sciences, engineering, architecture, and the social sciences, a mix of public policies, scientific knowledge and professional training can be more effectively used to help a society to reduce the hazard associated with an earthquake.

The Committee believes that a societal response research element provides the links between scientific and technological issues and rapidly developing major political, economic, social and organizational questions. For example, building codes, and other measures derived from engineering research are likely to have far greater effects in mitigating the impacts of earthquake as more is learned about the social, economic, political and legal factors that facilitate or hinder their acceptance or rejection by threatened communities.

Therefore, the need for research on policy analysis, program evaluation, organizational response, technology transfer, knowledge diffusion and other policy and implementation problems are too valuable to be lost as an identifiable part of a national effort to reduce the hazards associated with earthquakes, as well as other natural hazards. The Committee strongly urges NSF to continue support of this integral component of the National Earthquake Hazards Reduction Program.

Importance of the Continental Lithosphere Program at the National Science Foundation

Committee view

Scientific research on the continental lithosphere, and particularly on the continental crust, the upper 40 km of the 100 km thick lithosphere, is a great frontier of modern earth science. The subject is in its major discovery phase at the present time. Researchers are making new observations about the continental crust, and are developing a new and striking concept of continental tectonics to compliment and update the concept of plate tectonics that revolutionized earth science pertaining to oceanic phenomena in the 1960's.

Understanding continental tectonics is important because our evergrowing and ever more demanding society needs to understand thoroughly how to use our mineral, energy, and hydrological resources wisely and how we can use the earth to our benefit in other ways, such as waste storage. Of special relevance to the National Earthquake Hazards Reduction Program is the need to know how, why, where and when rupturing of the continents will occur and cause destructive earthquakes like the San Francisco earthquake of 1906, the New Madrid earthquakes of 1811–12, the Charleston earthquakes of 1886, or the catastrophic earthquakes that have occurred sporadically over many centuries in China. To know continental tectonics is the basic step.

The Committee applauds the proposed global digital seismograph network, which will provide information on the deep interior; the proposed 1000-station portable array, which is especially effective at intermediate-depth ranges; and a variety of other proposed geological, geochemical, and geophysical studies which are designed to probe this deep frontier, and which will provide information to facilitate the understanding of the continental lithosphere and its interaction with the deeper interior. Other techniques such as drilling and seismic reflection profiling will provide important information on the buried continental crust.

While the Committee is pleased with NSF's plans to establish a new and modern global digital seismic network beginning in FY1986, it recommends taht the work proceed in cooperation with the USGS which has primary responsibility for worldwide seismic networks. A joint cooperative program such as this will significantly enhance the existing global monitoring networks, providing valuable data for emergency response to damaging earthquakes and for basic seismological research. Although the amount authorized in the amendment adopted by the Committee is less than the President's FY 1986 request, the Committee recommends that the NSF continue to give high priority to the continental lithosphere program.

Importance of the United States Geological Survey (USGS) Program

Committee View

The USGS has responsibility for the major efforts of the Federal Government in earthquake related studies in seismology, geology,

geophysics, as well as important efforts in soils engineering. The Committee is concerned about the Administration's proposal to reduce the Survey's ongoing program from $36.554 million to $34.603 million. The Administration proposal to reduce the USGS effort comes at a time when the threat of a catastrophic earthquake in southern California is increasing and there is a greater need for support of the prediction program in that area.

Specifically, the proposal would reduce the number of seismographic stations in California, Alaska, Utah, Nevada and Washington; reduce geodetic monitoring in Alaska; reduce geophysical and geochemical monitoring along the San Andreas fault; and suspend some research projects in data analysis. It is essential however, that the monitoring networks be maintained, particularly since the USGS has recently forecasted a 90% probability of a moderate-sized earthquake to occur in the Parkfield, California area between 1984–1992. Furthermore, this area is also the location of the first phase of a prototype prediction network now being established, which could help to predicate or give warning of the oncoming earthquake expected in Parkfield. Seismologists now have a firm quantitative estimate of the likelihood of a great earthquake on the San Andreas Fault line. It is possible that some of these same techniques will be applicable to areas in the central and eastern United States. However, the Committee has heard evidence that this Nation is never going to predict earthquakes on any kind of a routine basis unless the U.S. develops an understanding of what is really going on in the Earth. A cutback in the budget of the USGS would seriously retard the earthquake prediction research effort. Fortunately, other elements of the Survey's earthquake program remain constant in the FY 1986 proposal. Consequently, the Committee adopted an amendment to restore partial funding at a level of $35.044 million to this important effort.

Importance of Eastern Earthquake Research

Committee View

Earthquake hazard in the United States is a national problem. Damaging earthquakes occur frequently enough in the western states to remind everyone of their threat. Furthermore, in many cases their fault rupture line is conspicious on the earth's surface, which tends to make people very conscious of their existence. In the eastern two-thirds of the country earthquakes occur less frequently, and the faults that produce them cannot be seen at the surface. Thus, the earthquakes are a hidden threat, although a very real one.

Very large earthquakes occurred east of the Mississippi in the 17th century and again in the 19th century. Moderately large earthquakes have occurred in Massachusetts, New Hampshire, New York, Virginia, South Carolina, Ohio, Illinois, Kentucky, Tennessee, Arkansas, Nebraska, Missouri, Oklahoma, Kansas and Texas since the time of settlement. Earthquakes approaching the level of damage, such as the recent one near Lancaster, Pennsylvania, have occurred in almost all the eastern states. They indicate that the potential for damage is everywhere present.

More than in most other parts of the U.S., the earthquake problem is compounded by high population density many old and large buildings, and a high degree of industrialization, including in particular, vulnerable installations such as nuclear power plants. Therefore, the Nuclear Regulatory Commission (NRC) has been the lead agency in seismological research. The NRC testified that this lead role was a significant resource drain in an area removed from their principal mission. The USGS indicated that it would be willing to take the lead role in earthquake hazard assessment research if funds are transferred from the NRC to perform the research.

The Committee believes that eastern earthquake research must continue and be an important aspect of the overall National Earthquake Hazards Reduction Program. The Committee is concerned about the possible changes in the seismic network in the eastern United States that is supported by the NRC. The Committee considers this instrumentation to be valuable for understanding and reducing earthquake hazards east of the Rocky Mountains. Although the Committee is not opposed to the transfer of these activities to the USGS, it would expect funds equal to the increase in responsibility also to be transferred.

Importance of the Center for Building Technology (CBT) at the National Bureau of Standards

Committee View

The Committee recommends $499,000 to reinstate the seismic codes and standards effort at the CBT. The Committee disagrees with the Administration's proposal to eliminate the CBT in the fiscal year 1986 budget request. The CBT is the only Federal organization with the breadth and depth of expertise on earthquake engineering required for technical support of Federal activities for improvement of seismic design and construction practices.

The U.S. investment in construction is at a rate of $310 billion per year, with better than half of that in seismic regions. A report released by the National Research Council, entitled "Earthquake Engineering Research—1982", stated "The present U.S. effort in earthquake hazard reduction is inadequate to solve the earthquake problem in the foreseeable future, that is, to make cities, industries, and military facilities safe against earthquakes." Estimates have been made that 3,000 to 23,000 fatalities will occur when the next catastrophic earthquake hits California. Most of the deaths and injuries would occur because of the failure of manmade structures.

The Federal Government clearly has an important role in sponsoring research and development that could lead to mitigation of earthquake losses. A major goal of such efforts is important in building practices.

The National Bureau of Standards has been assigned the following continuing responsibilities:

> Provide technical support to the building community, including the Federal agencies involved in construction, in continuing the development, testing, and improvement of model seismic design and construction provisions suitable for incorporation in local codes, standards (including federal standards)

and practices. Perform research on performance criteria and supporting measurement technology for earthquake resistant construction.

Funding for the development of standards has generally been budgeted by FEMA, while funding for research is in the Department of Commerce's budget.

The CBT through sponsorship of FEMA provides technical support to the Building Seismic Safety Council (BSSC) and the Interagency Committee on Seismic Safety in Construction (ICSSC). The BSSC was established in 1979 as a nonprofit organization comprised of representatives of the public and private sectors whose purpose is to enhance the public's safety by providing a national forum to foster improved seismic safety provisions for use by the building community. The ICSSC was established in 1978 to improve the Federal sector's building practices. In 1981 under NBS leadership the ICSSC issued a draft seismic standard for new Federal building.

Authorized funding for the CBT is essential to providing necessary research background for technical activities that the CBT conducts in support of the national earthquake hazards reduction program.

IV. SECTION-BY-SECTION ANALYSIS

Earthquake Hazards Reduction Act

A bill to authorize appropriations under the Earthquake Hazards Reduction Act of 1977 for fiscal years 1986 and 1987, and for other purposes.

Section 1

Authorizes $5,596,000, for the fiscal year ending September 30, 1986; and $5,848,000 for the fiscal year ending September 30, 1987, to the Director of the Federal Emergency Managemnt Agency to plan and coordinate the National Earthquake Hazards Reduction Program, to submit an annual report to Congress as outlined and other activities as specified in sections 5 and 6 of the Earthquake Hazards Reduction Act.

Section 2

Authorizes $35,044,000 for the fiscal year ending September 30, 1986; and $36,621,000 for the fiscal year ending September 30, 1987, to the U.S. Geological Survey to conduct research on the nature of earthquakes, earthquake prediction and induced seismicity.

Section 3

Authorizes $27,760,000, for the fiscal year ending September 30, 1986; and $29,009,000 for the fiscal year ending September 30, 1987, to the National Science Foundation to conduct research on earthquake processes, earthquake engineering and the socioeconomic implications of earthquakes.

Section 4

Authorizes $499,000, for the fiscal year ending September 30, 1986; and $521,000 for the fiscal year ending September 30, 1987, to the National Bureau of Standards to conduct research on performance criteria and measurement technology for earthquake-resistant construction.

Section 5

Requires the Five Year Plan for the National Earthquake Hazards Reduction Program to be updated every three years.

V. CHANGES IN EXISTING LAW MADE BY THE BILL, AS REPORTED

In compliance with clause 3 of rule XIII of the Rules of the House of Representatives, changes in existing law made by the bill, as reported, as shown as follows (existing law proposed to be omitted is enclosed in black bracksts, new matter is printed in italic, existing law in which no change is proposed is shown in roman):

EARTHQUAKES HAZARDS REDUCTION ACT OF 1977

* * * * * * *

Sec. 5. NATIONAL EARTHQUAKE HAZARDS REDUCTION PROGRAM.

(a) ESTABLISHMENT.—The President shall establish and maintain, in accordance with the provisions and policy of this Act, a coordinated earthquake hazards reduction program, which shall—

(1) be designed and administered to achieve the objectives set forth in subsection (c);

(2) involve, where appropriate, each of the agencies listed in subsection (d) and the non-Federal participation specified in subsection (h); and

(3) include each of the elements described in subsections (e) and (f) and the assistance to the States specified in subsection (g).

(b) DUTIES.—

(1) The President shall—

(A) assign and specify the role and responsibility of each appropriate Federal department, agency, and entity with respect to each object and element of the program; and

(B) establish goals, priorities, budgets, and target dates for implementation of the program.

(2) The Federal Emergency Management Agency (hereinafter referred to as the "Agency") is designated as the agency with the primary responsibilities to plan and coordinate the National Earthquake Hazards Reduction Program. The Director of the Agency (hereinafter referred to as the "Director") shall—

(A) recommend to the President the role and responsibility of each appropriate Federal department, agency, and entity with respect to each object and element of the program;

(B) recommend to the President goals, priorities, budgets, and target dates for implementation of the program;

(C) provide a method for cooperation and coordination with, and assistance (to the extent of available resources) to, interested governmental entities in all States, particularly those containing areas of high or moderate seismic risk;

(D) provide for qualified and sufficient staffing for the program and its components;

[(E) compile and maintain a written program plan for the program specified in subsections (a), (e), (f), and (g), which plan will recommend base and incremental budget options for the agencies to carry out the elements and programs specified through at least 1985, and which plan shall be completed by September 30, 1981, and transmitted to the Congress and shall be updated annually; and]

(E) compile and maintain a written plan for the program specified in subsections (a), (e), (f), and (g), to be submitted to the Congress and updated at such times as may be required by significant program events, but in no event less frequently than every three years;

(F) make, in cooperation with the United States Geological Survey, the National Science Foundation, and the National Bureau of Standards, an annual presentation to the appropriate committees of the Congress within 60 days after the end of each fiscal year for the purpose of communicating any events and any programmatic requirements deemed significant by the National Earthquake Hazards Reduction Program; and

[(F)] *(G)* recommend appropriate roles for State and local units of government, individuals, and private organizations.

* * * * * * *

SEC. 7. AUTHORIZATION OF APPROPRIATIONS.

(a)(1) GENERAL.—There are authorized to be appropriated to the President to carry out the provisions of sections 5 and 6 of this act (in addition to any authorizations for similar purposes included in other Acts and the authorizations set forth in subsections (b) and (c) of this section), not to exceed $1,000,000 for the fiscal year ending September 30, 1978, not to exceed $2,000,000 for the fiscal year ending September 30, 1979, and not to exceed $2,000,000 for the fiscal year ending September 30, 1980.

* * * * * * *

(6) There are authorized to be appropriated to the Director, to carry out the provisions of sections 5 and 6 of this Act, for the fiscal year ending September 30, 1986, $5,596,000, and for the fiscal year ending September 30, 1987, $5,848,000.

(b) GEOLOGICAL SURVEY.—There are authorized to be appropriated to the Secretary of the Interior for purposes for carrying out, through the Director of the United States Geological Survey, the responsibilities that may be assigned to the Director under this Act not to exceed $27,500,000 for the fiscal year ending September 30, 1978; not to exceed $35,000,000 for the fiscal year ending September 30, 1979; not to exceed $40,000,000 for the fiscal year ending Sep-

tember 30, 1980; $32,484,000 for the fiscal year ending September 30, 1981; $34,425,000 for the fiscal year ending September 30, 1982; $31,843,000 for the fiscal year ending September 30, 1983; $35,524,000 for the fiscal year ending September 30, 1984; [and] $37,300,200 for the fiscal year ending September 30, 1985; *$35,044,000 for the fiscal year ending September 30, 1986; and $36,621,000 for the fiscal year ending September 30, 1987.*

(c) NATIONAL SCIENCE FOUNDATION.—To enable the Foundation to carry out responsibilities that may be assigned to it under this Act, there are authorized to be appropriated to the Foundation not to exceed $27,500,000 for the fiscal year ending September 30, 1978; not to exceed $35,000,000 for the fiscal year ending September 30, 1979; not to exceed $40,000,000 for the first year ending September 30, 1980; $26,600,000 for the fiscal year ending September 30, 1981; $27,150,000 for the fiscal year ending September 30, 1982; $25,000,000 for the fiscal year ending September 30, 1983; $25,800,000 for the fiscal year ending September 30, 1984; [and] $28,665,000 for the fiscal year ending September 30, 1985; *$27,760,000 for the fiscal year ending September 30, 1986; and $29,009,000 for the fiscal year ending September 30, 1987.*

(d) NATIONAL BUREAU OF STANDARDS.—To enable the Bureau to carry out responsibilities that may be assigned to it under this Act, there are authorized to be appropriated $425,000 for the fiscal year ending September 30, 1981; $425,000 for the fiscal year ending September 30, 1982; $475,000 for the fiscal year ending September 30, 1983; $475,000 for the fiscal year ending September 30, 1984; [and] $498,750 for the fiscal year ending September 30, 1985; *$499,000 for the fiscal year ending September 30, 1986; and $521,000 for the fiscal year ending September 30, 1987.*

* * * * * * *

VI. OVERSIGHT ACTIVITIES

Committee oversight of the National Earthquake Hazards Reduction Program has consisted primarily of hearings; inspection of earthquake research facilities, staff attendance at FEMA, USGS, NSF and NBS meetings, and briefings and informal discussions between Committee Members, staff and Federal representatives that conduct the national program.

Hearings

Testimony was given by Federal representatives or others on the National Earthquake Hazards Reduction Program at oversight hearings held by the Committee between April 1984 and March 1985:

Authorization Hearings

March 19, 1985.

Other Related Hearings

Earthquakes in the Eastern U.S.—May 23 and September 12, 1984

Inspection of Earthquake Research Facilities

USGS and NSF research projects at California Institute of Technology's Seismological Laboratory in August, 1983.

NSF Earth Sciences research projects in seismic refection profiling at Cornell University—December, 1983.

USGS research projects at the Hawaiian Volcano Observatory, which are tied into the Earthquake Information System—December, 1984.

NBS earthquake research facility at the Center for Building Technology, at NBS in Gaithersburg, Maryland—July, 1984.

Attendance at National Earthquake Hazards Reduction Program Meetings

Members and staff of the Commmitee have met with FEMA, USGS, NSF and NBS staff to receive various briefings on budget and program matters.

Attendance and participation at a Regional Conference on Management of Earthquake Hazards in New England—November, 1984.

Plans

During the coming year the Committee plans for oversight include review of selected programs and projects within the National Earthquake Hazards Reduction Program.

VII. OVERSIGHT FINDINGS AND RECOMMENDATIONS BY THE COMMITTEE ON GOVERNMENT OPERATIONS

No statement of findings and recommendations on oversight activity pursuant to Rule X, clause 2(b)(2), and Rule XI, clause 2(l)(3)(D), of the Rules of the House of Representatives, have been submitted by the Committee on Government Operations for inclusion in this report.

VIII. COST ESTIMATE—CBO

U.S. CONGRESS,
CONGRESSIONAL BUDGET OFFICE,
Washington, DC, May 17, 1985.

Hon. DON FUQUA,
Chairman, Committee on Science and Technology, U.S. House of Representatives, 2321 Rayburn House Office Building, Washington, DC.

DEAR MR. CHAIRMAN: The Congressional Budget Office has prepared the attached revised cost estimate for S. 817, an act to authorize appropriations under the Earthquake Hazards Reduction Act of 1977 for fiscal years 1986 and 1987, and for other purposes. This estimate supersedes the previous estimate dated May 15, 1985, and reflects additional information from the committee staff regarding the amendments adopted by the committee.

If you wish further details on this estimate, we will be pleased to provide them.

With best wishes,

Sincerely,

RUDOLPH G. PENNER, *Director.*

CONGRESSIONAL BUDGET OFFICE COST ESTIMATE

1. Bill number: S. 817.

2. Bill title: An act to authorize appropriations under the Earthquake Hazards Reduction Act of 1977 for fiscal years 1986 and 1987, and for other purposes.

3. Bill status: As ordered reported by the House Committee on Science and Technology, May 13, 1985.

4. Bill purpose: This act authorizes appropriations for fiscal years 1986 and 1987 for programs in four agencies (the Federal Emergency Management Agency, the U.S. Geological Survey, the National Science Foundation, and the National Bureau of Standards). The fiscal year 1986 authorizations are the same as the fiscal year 1985 levels, while the 1987 levels represent a 4.5 percent increase over the previous year. S. 817 also alters the requirement to compile, maintain, and submit to the Congress a written plan for the various programs covered by this Act. Such reports are currently required annually, whereas this act would require them as may be necessitated by significant program events, but not less than every three years.

5. Estimated cost to the Federal Government:

[By fiscal years, in millions of dollars]

	1986	1987	1988	1989	1990
Authorization level	68.9	72.0			
Estimated outlays	42.2	64.4	27.6	6.7	

The costs of this act fall within budget functions 250, 300, and 450.

Basis of estimate: For the purposes of this estimate, it was assumed that the funds authorized by this act are appropriated prior to the beginning of each fiscal year and that all funds would be obligated and disbursed at rates similar to the recent experiences of the relevant agencies.

6. Estimated cost to State and local governments: None.

7. Estimate comparison: None.

8. Previous CBO estimate: On April 5, 1985, CBO prepared a cost estimate for S. 817, as ordered reported by the Senate Committee on Commerce, Science and Transportation. The authorization levels for the U.S. Geological Survey have been raised slightly in the House version, while the levels for the National Science Foundation have been lowered. The effect on total authorizations is not significant and resulting outlay differences do not exceed $1 million in any fiscal year.

On May 9, 1985, CBO prepared a cost estimate for S. 817, as amended and ordered reported by the House Committee on Interior and Insular Affairs. The authorization levels for fiscal years 1986 and 1987 in S. 817 as reported by the Committee on Science and

Technology represent a $1.6 million and $3.1 million decrease, respectively, relative to the version reported by the Committee on Interior and Insular Affairs. There is a corresponding decrease in estimated outlays between the two versions of the bill.

On May 15, 1985, CBO prepared a cost estimate for S. 817, as ordered reported by the House Committee on Science and Technology. This estimate supersedes the previous estimate and reflects additional information from the committee staff regarding the amendments adopted by the committee.

9. Estimate prepared by: Paul M. DiNardo.

10. Estimate approved by: C.G. Nucklos (for James L. Blum, Assistant Director for Budget Analysis).

IX. BUDGET ANALYSIS AND PROJECTION

S. 817 provides no new budget authority or tax expenditures. Consequently, the provisions of section 308(a) of the Congressional Budget Act are not applicable.

X. EFFECT OF LEGISLATION ON INFLATION

In accordance with Rule XI, clause 2(1)(4) of the Rules of the House of Representatives, the following statement is made concerning the inflationary impact of S. 817.

S. 817 is assessed to have no inflationary effect on prices and costs in the operation of the national economy.

XI. COMMITTEE RECOMMENDATION

A quorum being present, the bill was ordered reported on May 14, 1985, by a voice vote of the Committee.

XII. ADMINISTRATION VIEWS

FEDERAL EMERGENCY MANAGEMENT AGENCY,
Washington, DC, March 8, 1985.

Hon. THOMAS P. O'NEILL, JR.,
Speaker of the House of Representatives,
Washington, DC.

DEAR MR. SPEAKER: Enclosed is draft legislation "To authorize appropriations under the Earthquake Hazardous Reduction Act for fiscal years 1986 and 1987, and for other purposes."

The act would authorize appropriations for the Federal Emergency Management Agency, the United States Geological Survey, and the National Science Foundation.

The legislation would also change the requirement to submit an annual update to the program required by section 5(b)(2)(E) to a requirement for submission of the plan when needed, but in any event at least every 5 years. Also, the section would be revised to eliminate obsolete dates, and required details to be included in the Plan.

The Office of Mangement and Budget advises that there is no objection to the submission of this proposal for the consideration of

the Congress and that its enactment would be in accord with the President's program.

Sincerely,

GEORGE JETT, *General Counsel.*

Enclosure.

A BILL To authorize appropriations under the Earthquake Hazards Reduction Act for fiscal years 1986 and 1987, and for other purposes.

Be it enacted by the Senate and the House of Representatives of the United States of America in Congress assembled, That

(a) Section 7(a) of the Earthquake Hazards Reduction Act of 1977 is amended by adding at the end thereof the following new paragraph:

(6) There are authorized to be appropriated to the Director, to carry out the provisions of sections 5 and 6 of this Act, for the fiscal year ending September 30, 1986, $5,596,000, and for the fiscal year ending September 30, 1987, such sums as may be necessary.

(b) Section 7(b) of such Act is amended by striking out "and" after "1984", and by inserting "; $34,603,000 for the fiscal year ending September 30, 1986, and for the fiscal year ending September 30, 1987, such sums as may be necessary."

(c) Section 7(c) of such Act is amended by striking out "and" after "1984" and by inserting "; $28,700,000 for the fiscal year ending September 30, 1986, and for the fiscal year ending September 30, 1987, such sums as may be necessary."

(d) Section 5(b)(2)(E) of such act is amended by revising it to read as follows:

> "(E) compile and maintain a written program plan for the program specified in subsections (a), (e), and (g), which plan shall be submitted to the Congress, and shall be updated at such times as may be necessitated by significant program events but at least every five years."

XIII. ADDITIONAL VIEWS ON S. 817

I wish to comment on the amendment accepted by the Committee, which reduced the authorization levels recommended by the Subcommittee on Science, Research and Technology for the U.S. Geological Survey (USGS). The amendment restored funding to the National Bureau of Standards, the level-funded the National Science Foundation. The Federal Emergency Management Agency's budget was slightly reduced. However, the amendment cut the USGS—the nation's sole agency with statutory responsibility for issuing earthquake predictions and the assessment and warning of earthquake hazards.

I am deeply concerned that the proposed reduction will adversely impair the Geological Survey's ability to adequately monitor and predict earthquakes. The proposed Committee authorization level would reduce funding to the USGS in FY1986 by more than $1.5 million, compared to FY1985. The Committee on Science and Technology has proposed to authorize the USGS at a level of $35,044,000 in FY1986, and $36,621,000 in FY1987. In contrast, the Subcommittee on Science, Research and Technology recommended the FY1985 freeze level of $36,554,000 for the USGS in FY1986, and a 4.5% increase to a level of $38,199,000 in FY1987.

The amendment to reduce the USGS's authorization level was offered with the understanding that most of the reduction in 1986 will be offset by deficit-reduction saving and efficiencies in management. However, a review of the USGS's proposed budget for 1986 indicates that these reductions will have a serious impact on the USGS's earthquake program, forcing it to reduce earthquake and prediction monitoring in the Western United States and to discontinue critical projects in earthquake prediction research.

The USGS has indicated that the proposed FY1986 base reductions will require the elimination of 50 seismic stations in the Western U.S. The USGS would also have to eliminate monitoring of earthquake geodetic networks in Alaska, and to discontinue 20 geophysical and geochemical monitoring sites along the San Andreas fault in California. Additionally, the USGS would be forced to discontinue five projects in earthquake prediction research, which review and analyze earthquake prediction data.

I cannot justify the reduction of critical earthquake monitoring and prediction research at a time when there is an ever-increasing probability that a large, even catastrophic earthquake will occur in the U.S. In April the National Earthquake Prediction Evaluation Council endorsed studies of the USGS scientists who have predicted that a magnitude 6 earthquake will likely occur on the San Andreas fault near Parkfield in the next few years. In California, concern over the earthquake threat at Parkfield and other regions is such that legislation has been introduced in the State Assembly (copy attached) calling for ". . . upgrading of seismic and crustal

deformation instrumentation near Parkfield and the installation of up to two new seismic and crustal deformation instrument clusters along the southern San Andreas fault". It is proposed that the deployment of these systems be carried out as a joint project of the USGS and State agencies on a matching-fund basis. Given this level of concern by the State, it seems inappropriate at this time to cutback the USGS's monitoring effort—excluding any possibility of the USGS's participation in a joint effort with the State.

I am not alone in this concern. The House Committee on Interior and Insular Affairs already has voted to recommend that the USGS receive the FY1985 freeze level of $36,554,000 in FY1986, and to receive a 4.5% increase to a level of $38,199,000 in FY1987.

The USGS has an outstanding record of accomplishment and achievement in reducing the earthquake hazards of the U.S., and is deserving of our continued encouragement and support. I ask my colleagues in the House to reconsider the Science Committee's action, and to restore the FY1985 freeze level for USGS.

GEORGE E. BROWN, JR.

AMENDED IN ASSEMBLY APRIL 8, 1985

CALIFORNIA LEGISLATURE—1985–86 REGULAR SESSION

ASSEMBLY BILL, No. 938

Introduced by Assembly Member Alatorre, February 25, 1985

An act to add Chapter 10 (commencing with Section 2800) to Division 2 of the Public Resources Code, relating to earthquakes, making an appropriation therefor, and declaring the urgency thereof, to take effect immediately.

LEGISLATIVE COUNSEL'S DIGEST

AB 938, as amended, Alatorre. Earthquakes: prediction and emergency response.

(1) Existing law requires the Seismic Safety Commission to carry out various duties and responsibilities relating to earthquake prediction and earthquake hazard mitigation.

This bill would require a prototype earthquake prediction system to be established in 2 specified regions of the state as a joint project of the Department of Conservation and the United States Geological Survey. The bill would require the department to report to the Governor and *the* Legislature within 12 months after installation of the prototype system or by January 1, 1987, *whichever occurs first,* and to make annual reports thereafter. The project would terminate on January 1, 1992, unless extended by statute.

The bill would require [the commission and] the Office of Emergency Services to develop a comprehensive emergency response plan for short-term earthquake predictions which would include certain criteria. The bill would require the [commission and the] office to consult with the department, *the commission,* the United States Geological Survey, and the Federal Emergency Management Agency in the development of the plan.

(2) The bill would appropriate an unspecified sum from the General Fund, *with an unspecified amount allocated* to the Department of Conservation to establish the prototype earthquake prediction system and [for allocation] *an unspecified amount allocated to the Office of Emergency Services* for the development of a comprehensive response plan, *but would prohibit encumbrance of the funds until matching federal assistance funds are received.*

(3) The bill would take effect immediately as an urgency statute.

Vote: ⅔. Appropriation: yes. Fiscal committee: yes. State-mandated local program: no.

The people of the State of California do enact as follows:

SECTION 1. Chapter 10 (commencing with Section 2800) is added to Division 2 of the Public Resources Code, to read:

CHAPTER 10. EARTHQUAKES

2800. The Legislature finds and declares all of the following:

(a) The state's major metropolitan areas are subject to potentially devastating large magnitude earthquakes and earth scientists estimate that there is a high probability that one or more large earthquakes will occur in California between now and the end of the century.

(b) Loss of life and property damage resulting from a damaging earthquake could be substantially reduced if there existed a reliable short-term earthquake prediction system capable of providing public warning of the size and location of a damaging earthquake within a timeframe of a few weeks to a few hours.

(c) While earth scientists are not in full agreement about the feasibility of short-term earthquake prediction, there is increasing interest in the possibility that precursory geochemical and geophysical phenomena can be identified within short timeframes and that these precursory events can become the basis for timely and reliable warnings of an impending earthquake.

(d) Progress in determining the feasibility of an operational earthquake prediction system is hampered in California by the lack of a coordinated network of seismic instrumentation designed for earthquake prediction and an inability to monitor and analyze the data collected on a continuous 24-hour basis.

(e) In anticipation of a successful earthquake prediction system proving to be feasible, there is a need to develop [simultaneously] a short-term prediction emergency response plan which, among other things, will propose strategies to deal with false alarms and the possibility that a damaging seismic event could still occur without a prediction.

2801. (a) A prototype earthquake prediction system shall be established in the following two regions of high seismic potential:

(1) The central San Andreas fault near Parkfield in the County of Monterey.

(2) The southern San Andreas fault north of the County of Los Angeles.

(b) The system shall include the upgrading of seismic and crustal deformation instrumentation near Parkfield and the installation of up to two new seismic and crustal deformation instrument clusters along the southern San Andreas fault in areas selected from

among the following segments of the fault: Cholame, Tejon Pass, Cajon Pass, San Gregorio Pass, the Salton Sea near Brawley, and the Anza region. The data from this instrumentation shall be monitored and analyzed continously to determine if precusory phenomena can be identified with sufficient certainty.

(c) The system shall be carried out as a joint project of the department and the United States Geological Survey. The department shall consult with the Seismic Safety Commission and the Office of Emergency Services in the conduct of the project.

(d) Within 12 months after the installation of the system, or by January 1, 1987, whichever occurs first, the department shall issue a progress report to the Governor and the Legislature. An annual progress report shall be made each year thereafter. The project shall terminate on January 1, 1992, unless extended by statute.

2802. (a) Concurrently with the development of a prototype earthquake prediction system, [the Seismic Safety Commission and] the Office of Emergency Services shall [jointly] develop a comprehensive emergency response plan for short-term earthquake predictions. The plan shall include all of the following:

(1) A method of peer review involving the California Earthquake Prediction Council to evaluate the validity of short-term earthquake predictions.

(2) A means of rapidly activating governmental response to a predicted event.

(3) Plans for mitigating earthquake losses to vulnerable populations, including, but not limited to, drawdown of impoundment levels behind dams, positioning of emergency equipment in safe areas, and mobilization of firefighting, law enforcement, rescue and medical personnel.

(4) A public warning system.

(5) Strategies for dealing with earthquake predictions that fail to occur (false alarms) and the failure of an earthquake prediction system to forecast a damaging event.

(b) The [Seismic Safety Commission and the] Office of Emergency Services shall consult with the department, *the Seismic Safety Commission,* the United States Geological Survey, and the Federal Emergency Management Agency in the development of the plan.

2803. The department and the Seismic Safety Commission may solicit and receive gifts and grants from other public and private agencies for the state's share of costs under this chapter.

SEC. 2. The sum of ———— dollars ($————) is hereby appropriated from the General Fund *for allocation as follows:*

(a) ———— dollars ($————) to the Department of Conservation for the purpose of establishing the prototype earthquake prediction system[, and for allocation].

(b) ———— dollars ($————) to the Office of Emergency Services for the development of a comprehensive earthquake prediction response plan, as described in Chapter 10 (commencing with Section 2800) of Division 2 of the Public Resources Code. [However, the] *No* appropriated funds may [not] be encumbered until matching federal assistance funds are received by the state.

SEC. 3. This act is an urgency statute necessary for the immediate preservation of the public peace, health, or safety within the

meaning of Article IV of the Constitution and shall go into immediate effect. The facts constituting the necessity are:

In order that state funding may be coordinated with federal funding for earthquake prediction research which is expected to become available in October of 1985, it is necessary that this act take effect immediately.

○